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THE INFLUENCE OF CLASS SIZE ON ACADEMIC ATTAINMENT AND STUDENT SATISFACTION.

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This investigation determined if students showed a difference in academic attainment or attitude toward school as a result of membership in an average or above average size group. Some 224 male and female students in average or above average size classes in Business Law, Introduction to Business, and Government served as subjects. They were randomly scheduled into classes. Pretest and posttest scores on teacher-made tests were analyzed to measure academic attainment. No significant difference in academic attainment was found for either Business Law or Introduction to Business classes. A significant difference was found for the course on government. No significant differences for satisfaction with learning environment, resulting from differences in class size, were found for any of the three courses. (PS)

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PREFACE

Brian M. Cram wrote the review of literature for this investigation. George A. Jeffs completed the statistical treatment of collected data. The investigators collaborated on the procedures and findings sections of this report.

ACKNOWLEDGEMENT

The authors wish to acknowledge the help of Mr. Jess Foster and Mr. Rodney Holst and a number of students at Clark High School.

George A. Jeffs

Brian M. Cram

July, 1968

INTRODUCTION

The issue of class size in relation to student achievement and attitude has been a thorny problem to educators since the inception of the classroom setting. The optimal number of students that should be assigned to any one classroom is still a moot question.

Today educators are in the process of dissecting the many layers of the class size concept to determine if previous conclusions about class size are still relevant. It seems that there is some agreement that it is not likely that there is an optimum size for all classes or even for the same class in different schools.

Class size is considered of primary importance in contemporary educational planning; however, it should not be assumed that experimental interest in class size has been restricted to the present.

The first study of class size is reported to have been carried out by Rice[1] in 1896, but a statement by Rice in The Forum in 1902 correctly identifies his first study as occuring in 1902:

> The test in arithmetic on which this article will be based was taken in the early part of the present year. I made a similar test some six years ago, soon after I had completed the one in spelling; but my editorial duties at the time prevented me from following up the investigations in a satisfactory manner, and I therefore did not publish the results.[2]

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[1] Henry J. Otto, "Class Size," Encyclopedia of Educational Research (New York: The MacMillan Company, 1950), p. 212.

[2] J. M. Rice, "Educational Research: A Test in Arithmetic," The Forum, 34:282, October 1902.

Studies carried out before the 1920's were, in the main, poorly controlled and reported. It was not until about 1920 that standardized instruments and procedures began to emerge. The period from 1920 to 1935 produced a large number of studies investigating class size. Blake, in 1954, concluded that, "More than half of all class size studies were conducted between 1920 and 1935."[3] From 1935 until the present there has been a gradual decrease in the number of investigations dealing with class size.

It is reasonable to assume that as a result of new approaches to secondary education the number of investigations dealing with class size will increase. It is unlikely that previous research alone can supply meaningful answers to current questions and it is expected that researchers using contempory techniques will be called upon to analyze the class size concept.

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[3] Howard J. Blake, Class Size: A Summary of Selected Studies in Elementary and Secondary Schools (New York, Ed. D. Project, Teachers College, Columbia University, 1954, p. 79

HYPOTHESES

The purpose of the current investigation was to determine if there were significant differences in academic attainment and satisfaction with learning environment of students taught in average as compared to above average size groups. The following hypotheses were constructed and tested:

1. There will be no significant difference in academic attainment in Business Law between students taught in average size groups and students taught in above average size groups.
2. There will be no significant difference in academic attainment in Introduction to Business between students taught in average size groups and students taught in above average size groups.
3. There will be no significant difference in academic attainment in U.S. Government between students taught in average size groups and students taught in above average size groups.
4. There will be no significant difference in satisfaction with learning environment between students taught Business Law in average size and above average size groups.
5. There will be no significant difference in satisfaction with learning environment between students taught Introduction to Business in average size and above average size groups.
6. There will be no significant difference in satisfaction with learning environment between students taught U.S. Government in average size and above average size groups.

DEFINITION OF TERMS

t-Test. The term "*t*-test" refers to the ratio of a statistic to its standard error; "t" is mathematically equal to the critical ratio but provides a more critical test than does a normal probability table. All *t*-tests used in this study were two-tailed.

Two-Tailed Test. A test of significance that asserts that the two means are different is referred to as a "two-tailed test." No assertion was made about the direction of the differences.

Classroom Environment. The term "classroom environment" refers to the external conditions and factors within the classroom which might influence the student.

Average Size Group. The designation "average size group" was used to refer to a class membership of twenty-four to twenty-six students. The average size group was also called the control group.

Above Average Size Group. The term "above average size group" refers to a class membership of forty-five to fifty-two students. In the current study, the "above average size group" was also called the experimental group.

z Value. The *z* value is the result obtained from a test of significance of the difference between two independent proportions. The *z* value was obtained by dividing the observed difference between the proportions by the estimate of the standard error of the difference.

Objective Test. An "objective test" as used in this study, is a teacher-made test that uses questions scored by a key of correct answers. No validity data is offered for the objective tests employed. Reliability data, however, for the objective tests is supplied.

Academic Attainment. The term "academic attainment" was used to refer to the level of knowledge reached by students as measured by an objective test.

Academic Achievement. Refer to academic attainment.

Student Satisfaction. This term refers to the degree to which a student felt his learning environment was satisfactory or unsatisfactory as measured by a student attitude survey.

Student Attitude. The degree to which a student approved or disapproved of his learning environment was referred to as "student attitude."

ASSUMPTIONS

1. It was assumed that the use of the same classroom areas for both the experimental and control groups reduced differences in physical classroom environment.

2. It was assumed that students would express their honest opinions when responding to the attitude survey.

3. It was assumed that student satisfaction was accurately measured by the Clark High School Student Opinion Survey.

4. It was assumed that the teacher-made objective tests possessed some degree of validity.

REVIEW OF LITERATURE

The relationship of class size to educational cost and instructional methods has made it an issue of importance to educators. There have been numerous studies concerned with class size. This section of the paper will review significant studies concerned with the class size issue. The review will use a chronological approach to examine investigations.

Elementary School Investigations

The first published study of class size was carried out by Rice[1] in 1902. The primary concern of the study was not with class size, but as one of the conclusions of the study he found that class size has no effect upon achievement.

In 1909 Cornman[2] studied the effect of class size upon promotion rate in 320 elementary classes. The elementary classes were divided into three groups: less than forty pupils, forty to forty-nine pupils, and fifty or over. Using administrative records he found the promotion rate to be highest in the forty to forty-nine group with 84.5 percent promoted. The less than forty group showed a promotion rate of 83.2 and the fifty or over group had an 80.3 percent promotion rate. Approximately three hundred classes were studied to determine the effect of class size upon achievement and conduct. The large classes were superior in achievement and conduct. No attempt was made by Cornman to control any of the variables. The data were collected from administrative records.

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[1] J. M. Rice, "Educational Research: A Test in Arithmetic," The Forum, 34:281-97, October, 1902.

[2] Oliver P. Cornman, "Size of Class and School Progress," Psychological Clinic, 3:206-212, December 15, 1909.

Boyer[3] did a follow up of Cornman's study in 1913. Classes were divided into six groups ranging in size from under thirty to over fifty. He found that in the primary grades the medium sized classes had the highest promotion rate. In the upper grades the promotion rate decreased as class size increased.

F. W. Bachman[4] and E. C. Elliot[5] studied promotion rates in New York and several New England cities and in separate studies each concluded that there was little or no difference in promotion rate as a result of class size. In 1915, Harlan[6] studied the relationship of class size with promotion rates, percentage of withdrawals, score on Courtis math tests, time wasted by pupils, non participation by pupils, percentage of attention, and time taken up with routine activities. He concluded that:

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[3] Philip A. Boyer, "Class Size and School Progress," Psychological Clinic, 8:82-90, May 15, 1914.

[4] Frank W. Bachman, Final Report of the New York Committee on School Inquiry, 1911-1913, Vol. I, Part II, pp. 606-609.

[5] E. C. Elliot, Variations in the Achievements of Pupils (New York: Columbia University, Teachers College Contributions to Education, No. 72, 1914), p. 114.

[6] Charles L. Harlan, "Size of Class as a Factor in Schoolroom Efficiency," Educational Administration and Supervision, 1:195-212, March, 1915.

1. Maximum promotion rate was in the smallest classes.
2. There was a higher percentage of withdrawals in the larger classes.
3. The medium sized classes were superior in math achievement.
4. There was no regular increase in failure to participate or in inattention as class size increased.
5. Small classes waste more time than larger classes.
6. There was no systematic decrease in efficient classroom management with increase in class size.

Although Harlan's study considered more factors than previous studies he did not attempt to control any variables such as teacher difference, I.Q. of group, or learning environment.

The first published study that was specifically designed to experimentally analyze the relationship between class size and pupil achievement was conducted by Breed and McCarthy.[7] Large and small classes were paired and an attempt was made to control teaching method used, time for study and recitation, and testing techniques. The improvement of elementary students in learning spelling words was tested using a pretest-posttest design. With the exception of grade seven, the greatest improvement was shown by the large classes. The investigators did not attempt to equate the intelligence level of the groups and they assumed that twenty days was an adequate amount of time between pretest and posttest.

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[7] Fredrick S. Breed and Grace D. McCarthy, "Size of Class and Efficiency of Teaching," School and Society, 4:965-971, December 23, 1916.

The research investigations carried out before the 1920's may be thought of as poorly designed. A summary by Hudelson evaluates this experimental era.

> The results of investigations conducted before 1917 indicate that, in general, unless elementary school classes exceed 45 or 50 there is no clear evidence of diminished efficiency. Thus far, however, there had not been taken into consideration a number of factors which may reasonably be expected to affect the results of teaching. No devices were then available for measuring some of these factors. Progress had gone about as far as it had the means of going; consequently, after 1915-16 there was a lull of four or five years while educational scientists were deriving, refining, and standardizing intelligence and achievement tests materials. When experimentation was resumed about 1920, these powerful instruments were at hand to aid investigators in measuring factors that theretofore they had not been able to control.[8]

Stevenson[9] investigated fifty classes in grades two, five and seven. Each teacher involved in the study taught a large class and a small class containing the same students, in two different semesters. The subjects were paired in intelligence. Using an achievement test as criteria he found that the large classes showed superiority in grade two, while the small groups were superior in grades five and seven. A superiority of eight percent in favor of the small classes was found when all classes were combined. Stevenson[10] conducted a second study in 1925 to determine the optimum class size for maximum efficiency. He found that efficiency is about the same up to forty-three students. After that number is reached efficiency drops off rapidly. The studies conducted by Stevenson are probably among the best designed investigations carried out before 1925. Stevenson attempted to control many of the experimental variables overlooked by previous investigators. An ealier study conducted by Almack[11] also recognized the need to control experimental variables. This study was probably the first reported study using a well designed paired group technique.

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[8] Earl Hudelson, Class Size at the College Level (Minneapolis, Minnesota: The University of Minnesota Press, 1928), pp. 17-18.

[9] P. R. Stevenson, "Smaller Classes or Larger: A Study of the Relation of Class Size to the Efficiency of Teaching," Journal of Educational Research Monographs, No. 4, 1923 (Bloomington, Illinois: Public School Publishing Company, 1923), p. 127.

[10] P. R. Stevenson, "Class Size in the Elementary School," The Ohio State University Studies, Vol. II, No. 10, Bureau of Educational Research Monographs, No. 3 (Columbus, Ohio: Ohio State University College of Education, Bureau of Educational Research, 1925), p. 35.

Bjarnason[12] investigated the relationship between group attention and group size. He concluded that the teacher of the large group had better control of class attention; however, he discounted this finding because of the superior initial ability held by the large group teacher. Bjarnason's observation concerning the inequality of the large group and small group instructor points out the growing awareness by researchers of the influence of uncontrolled variables.

In 1928, Bates[13] conducted one of the earliest investigations of the relationship between class size and achievement. A pretest-posttest technique was used to study the ability of elementary students to learn spelling words. It was concluded that students in grades four through six showed greatest achievement in large classes. Students in grade seven achieved better in small classes. Bates provided a standardized teaching procedure to be used by the instructors. No attempt was made to control initial I.Q. differences between the groups. It was also assumed that twenty days between pretest and posttest would be enough time period to eliminate practice effects.

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[11] John C. Almack, "The Adaptation of the School Building to a Program of Educational Efficiency," (Unpublished Doctor's Dissertation, Palo Alto, California, Stanford University, 1922), p. 127.

[12] Lofter Bjarnson, "Relation of Class Size to Control of Attention," Elementary School Journal, 26:36-41, September, 1925.

[13] Daniel A. Bates, "The Relation of the Size of Class to the Efficiency of Teaching," Department of Secondary School Principals Bulletin, 24: 22-23, January 1929.

F. L. Whitney[14] gained the sponsorship of the N.E.A. to study the relation of class size to educational efficiency. He studied groups of forty-five or more pupils, thirty-six to forty-five pupils, twenty-six to thirty-five pupils, and twenty-five or fewer pupils. It was concluded that achievement was highest in classes from thirty-six to forty-five pupils and lowest in classes of twenty-five or fewer pupils. Whitney[15] also conducted a similar study of grades one through four in the following year. He divided the experimental classes into groups of twenty or fewer and of forty or more. The groups were paired using age, and intelligence to equate the groups. Halfway through the study the groups of forty or more were reduced to twenty or fewer and the groups of twenty were increased to forty or more. In each grade one group of twenty students was instructed in a large group and a small group setting. Each pair of groups was instructed by the same teacher. The small groups showed slightly higher achievement than the large group.

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[14] F. L. Whitney, "A Class Size Study in the Primary School," Fourth Yearbook. Department of Classroom Teachers, National Education Association. Washington, D. C.: 1929, pp. 95-98.

[15] F. L. Whitney, "Preliminary Report on the Trinidad, Colorado, Study of Class Size," Fifth Yearbook, Department of Classroom Teachers, National Education Association, Washington, D. C., 1930, pp. 291-94.

In 1932, Whitney and Willey[16] followed the general format of the two previously reported studies by Whitney. The findings of the study showed small classes to possess superior achievement. The opinions of teachers as to group size preference revealed the following observations:

1. Small groups experienced a lack of competition and did not reflect a democratic situation.
2. Large groups limited individualized instruction and made it difficult to keep adequate classroom discipline.

Helen Dawes[17] conducted a study investigating the relationship between class size and seating position upon learning and class participation. The subjects were 433 kindergarten pupils. Dawes concluded that classes between fourteen and forty-six are able to retain about an equal amount of a story read tc them. It was also concluded that as group size increases the opportunity to take part in group discussion decreases. Another factor studied was the influence of seating position within the room upon retention and class discussion. It was concluded that seating position does not influence retention but does lower the extent to which the student participates in class discussion.

In 1943, Newell[18] made a study of four high income cities in New Jersey. In each city nine classes consisting of three small classes

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[16] F. L. Whitney and Gilbert S. Willey, "Advantages of Small Classes," School Executives Magazine, 51: 504-06. August 1932.

[17] Helen C. Dawes, "The Influence of Size of Kindergarten Group Upon Performance," Child Development, 5:295-303, December, 1934.

[18] Clarence A. Newell, Class Size and Adaptability (New York: Bureau of Publications, Teachers College, Columbia University, 1943), p. 99.

(ADM of fewer than twenty-five), three medium classes (ADM of twenty-five to thirty), and three large classes (ADM of more than thirty pupils) were studied. Newell studied the effect of class size on a schools' ability to take on new practices. He stated new practices to be such things as field trips, individualized instruction, informal seating, etc. He concluded that other conditions being favorable, small classes tend to adopt new practices more readily than do large classes.

A two year study conducted by Lundberg[19] compared reading in an elementary school after the student-teacher ratio was reduced from 37: 1 to 30:1. Standardized tests were used to measure achievement. He found that pupils made higher scores, attendance increased, and behavior improved after the class reduction. Poor control of experimental variables was exercised by Lundberg.

Probably the most comprehensive study of class size in the elementary school was conducted by four investigators,[20] under the direction of Henry J. Otto. Using a team-approach the investigators studied existing conditions and practices in fifty small and fifty large elementary school classes. The sample was composed of thirty-four classes from grades two and four and thirty-two classes from grade six. The data were gathered by questionnaire and interviews. A detailed consideration of the results will not be given but a statement by Otto will be used to review the results.

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[19] Lawrence D. Lundberg, "Effects of Smaller Classes," Nations Schools, 39: 20-22, May 1947.

[20] Minnie Lozier Condon, "Teaching Load and Teacher Knowledge of Pupils as Factors in Class Size in Elementary Schools (unpublished Doctor's dissertation, Austin, Texas: The University of Texas Library, 1953), Austin, Texas: James, "Teaching Techniques and Classroom Activities as Elements in Class Size in Elementary Schools" (unpublished Doctor's dissertation, Austin, Texas: The University of Texas Library, 1953), p. 268; Wlademar Olson, "Curriculum Scope and Organization as Class Size Factors in Elementary Schools," (unpublished Doctor's dissertation,

He commented on the study:

> The wisest conclusion which the writers can make is that, in the 50 small and 50 large classes included in this study, the total educational program for children was not discernably different in small classes from that found in large classes.[21]

Richman,[22] studied middle elementary grades that had been increased or decreased by deliberate administrative action. He used a check list of sixty-two select practices to determine by interview and observation what effects large and small classes have upon the frequency of use of these desired practices. He found that as class size was reduced the frequency of use of the sixty-two items increased.

An investigation by Ross and Straub[23] used a recorded interview technique to obtain opinions about class size from elementary school teachers. They found that almost all the forty-four teachers interviewed felt that small classes are better for individual students, are more stimulating, are better to teach fundamentals, and provide more enrichment.

Austin, Texas: The University of Texas Library, 1953), 239p.; Robert A. Weber, "Space Relationships, Instructional Aids, and Human Relationships as Class Size Factors in Elementary Schools," (unpublished Doctor's dissertation, Austin, Texas: The University of Texas Library, 1953), 288 p.

[21] Henry J. Otto _et al_, "Class Size Factors in Elementary Schools," _Bureau of Laboratory Schools Publication_, No. 4 (Austin: The University of Texas, 1954), p. 145.

[22] Harold Richman, "Educational Practices as Affected by Class Size" (New York: Ed. D. Project, Teachers College, Columbia University, 1955).

[23] Maurice J. Ross and Ruth Straub, _Significant Areas For Study in the Determination of Class Size_ (Hartford: Connecticut State Department of Education, Bureau of Research and Surveys, January 1954), p. 43.

Secondary School Investigations

Stevenson[24] conducted the first recorded study of class size on the high school level. He paired the large (thirty to thirty-five students) and small (fifteen to twenty students) groups and assigned the same teacher to teach each pair of classes. Pretest scores on achievement tests showed slightly higher achievement for the small groups.

Using the same experimental design the investigator[25] conducted a follow up study and reported similar results.

In 1923, Davis[26] investigated large and small classes in one hundred schools holding membership in the North Central Association. Teachers using standardized instructional procedures taught the students for nine weeks. At the end of the nine week period students were tested and given a letter grade. Analysis of grades received by students in different schools showed no difference in achievement in large and small groups. Davis followed sound procedures in his pairing technique put permitted each school to make up its own test which would serve to make any results invalid.

The University of Minnesota encouraged faculty investigation of class size and prompted the production of perhaps the best designed study up to about 1930. An experiment conducted at the University of Minnesota High

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[24] P.R. Stevenson, Smaller Classes or Larger: A Study of the Relation of Class Size to the Efficiency of Teaching. Journal of Educational Research Monographys, No. 2, 1923, Bloomington, Ill: Public School Publishing Company, 1923, pp. 127.

[25] P. R. Stevenson, "More Evidence Concerning Large and Small Classes," Educational Research Bulletin, Vol. IX, No. 11 (Columbus, Ohio: Ohio State University, College of Education, Bureau of Educational Research, 1925), pp. 231-33.

[26] C. O. Davis, "The Size of Classes and the Teaching Load in the High Schools Accredited by the North Central Association," School Review, 31: 412-429, June 1923.

School involved a two year study of achievement in English. The sample was composed of two large classes and two small classes, which were paired and individual students in each class were matched. A battery of achievement tests was used to evaluate achievement. The large classes showed higher achievement on the tests. Observers were present at all class sessions and indicated the following: Pupils in the large classes showed superiority in interest, spirit and enthusiam; replies on a questionaire by students indicated that the large group was most preferred; the teacher felt that the large class was more stressful to instruct.[27]

The controls built into the design are outstanding and by far overshadow the limitations of using a small sample.

Another study carried out at Minnesota High School was conducted by Leonard D. Haertter.[28] He studied achievement in geometry in large (fifty-five) and small (twenty) groups. No significant gain was made by either group although the large group did show a slight superiority. In this as in any study conducted in a laboratory school it should be understood that the school environment is not typical of most schools.

In 1930, Bloomfield[29] measured achievement in American History. Two groups consisting of one large (fifty-five pupils) and one small (thirty pupils) were studies. The groups were paired on previous knowledge of subject of intelligence. The instructor used the same teaching method for both groups. The investigator selected thirty pupils out of the fifty-five in the large group and matched them with the small group. No difference was found for the two groups. The limited size of the sample restricts generalization of the findings to other situations.

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[27] Dora V. Smith, Class Size in High School English (Minneapolis: University of Minnesota Press, 1931), p. 309.

[28] Leonard D. Haertter, "An Experiment of the Efficiency of Instruction in Large and Small Classes in Plane Geometry," Educational Administration and Supervision, 14: 580-590, November 1928.

[29] L. S. Bloomfield, "Class Size in Senior American History," Bulletin of the National Association of Secondary School Principals, 26: 6-9, January 1930.

An interesting departure from the format of most class size studies was an investigation conducted by Jensen and Jensen.[30] The investigators taught boys and girls in separate classes that were homogeneously grouped. A pretest-posttest design was used to determine achievement in algebra. The teachers taught both large and small groups and varied their teaching technique to best suit a large or small group. The small groups were concluded superior in achievement on the posttest. This study was sponsored by the National Education Association.

In 1934, Hand and Smith[31] completed a study of three ninth grade business classes. The large group of 105 students was compared with two smaller classes of twenty-five and twenty-two students respectively. The groups were judged equal in intelligence on the pretest. Although a slight gain was shown by the smaller groups, this gain was not statistically significant.

Kurtz[32] conducted a study of achievement in English composition in a class of thirty-nine pupils as compared with a class of eleven pupils. The instructor felt the large class more interesting but felt that she could not give enough attention to pupils in the large group.

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[30] Milton B. Jensen and Dortha W. Jensen, "The Influence of Class Size Upon Pupil Accomplishment in High School Algebra," Journal of Educational Research, 21: 120-137, February 1930.

[31] Harold C. Hand and J. W. Smith, "Effectiveness of Instruction in a Class of One Hundred Pupils," The School Review, 42: 751-54, December, 1934.

[32] Frieda Kurtz, "Large or Small Classes in English Composition--Which," English Journal, 18:675-682, October, 1929.

One of the best designed studies of class size was carried on in the Phoenix Union High School System by Eastburn,[33] from 1933 to 1936. Eastburn investigated the effect of class size upon achievement in homogeneously grouped classes. He also studied the reactions of the teachers to the groups and the development of pupil attitudes. Achievement in large and small groups in American History and in 11th grade English was investigated and standardized and improvised tests were used to determine achievement shown by upper ability, middle ability, and lower ability students. The only significant difference was found in the higher achievement of the large group (sixty students) over the small group (thirty students) in the middle ability range. The pupils in the large group showed higher attitude scores. There was no consistent preference by the teachers for the large or small group.

In another investigation, Eastburn[34] compared the findings of the above study with achievement shown in large groups (sixty pupils). Each of three teachers taught five classes of sixty pupils each. When compared with the small groups of the previous study, all of the large groups showed higher achievement.

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[33] Lacey A. Eastburn, "The Relative Efficiency of Instruction in Large and Small Classes on Three Ability Levels." Journal of Experimental Education, 5:17-22, September 1936.

[34] Lacey A. Eastburn, "A Report of Class Size Investigations in the Phoenix Union High School, 1933-34 to 1935-36," Journal of Educational Research, 31: 107-117, October 1937.

Baker[35] investigated the effect of class size upon the teachers' degree of knowledge about pupils. He concluded that there is a statistically significant difference favoring small groups.

In 1949, Ellsworth Tompkins[36] studied the opinions of 504 English, mathematics, and social studies teachers. The teachers defined a small class as including fifteen to twenty pupils and a large class as including thirty-five or more pupils. The teachers concluded that a class fewer than thirteen was too small for efficient instruction and a class of more than thirty-two was too large for efficient instruction. A large majority of the teachers indicated that their present classes were too large. The teachers implied that small classes were superior because they permitted individualized instruction.

Students' scores on chemistry examinations and standardized tests in seventy-three high schools were studied to determine the relationship between achievement and the number of pupils taught per day. The investigator[37] found that there is a direct relationship between reduction of class size and increase of scores of chemistry tests.

From 1900 to 1950 more than 250 investigations considered class size.[38] Blake[39] surveyed the investigations during this time period. He eliminated those not dealing with public elementary and secondary schools and those that were not reports of original research. He found eighyt-five of the over 250 studies met his requirements. Of the eighty-five studies selected, he concluded that thirty-five favored small groups; eighteen favored large groups; and thirty-two did not favor either.

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[35] Leigh H. Baker, "Class Size Does Make a Difference," The Nations Schools, 17:27-28, February, 1936.

[36] Ellsworth Tompkins, What Teachers Say About Class Size, U.S. Office of Education, Circular No. 311, (Washington: Government Printing Office, 1949), p. 45.

[37] Kenneth E. Anderson, "The Relationship Between Teacher Load and Student Achievement," School Science and Mathematics, 50: 468-470, June 1950.

[38] Henry J. Otto, "Class Size," Encyclopedia of Educational Research (New York: The MacMillan Company, 1941), p. 215.

[39] Howard J. Blake, Class Size: A Summary of Selected Studies in Elemtary and Secondary Schools (New York: Ed. D. Project, Teachers College, Columbia University, 1954).

He then further refined his sample by using six major criteria for selection:

1. Scientific control
2. Adequacy of sample
3. Adequacy of measurement of variable
4. Adequacy of measurement of criterion
5. Rigorousness of examination of data
6. Appropriateness of conclusions

He found that twenty-two studies met the above criteria. Of the twenty-two, sixteen favored small classes; three favored large groups; and three were inconclusive.

A well designed investigation of the relationship between class size and achievement was conducted by Engstrom.[40] Two small groups (thirty to thirty-five) were compared with two large classes (107 to 192).

The small groups were instructed by one instructor while the large groups were taught by two instructors and a teacher's aid per group.

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[40] Erland Richard Engstrom, "A Study of Large Group Instruction in First Year Algebra," U.S. Department of Health, Education, and Welfare, Bulletin No. 12 (Washington: Government Printing Office, 1963), pp. 38-39.

The top and bottom fifth of the groups were compared on achievement. Engstrom concluded that there was no significant difference between the large and small groups. The investigator also judged the large group superior in

1. Individual attention to students
2. Individual instruction
3. Discipline
4. Competition among students

In 1966, Joseph Madden[41] reported an investigation of the relationship between class size and achievement in general mathematics. He found that student achievement is significantly higher in large groups (seventy to eighty-five) than in regular sized groups (twenty-five to forty). He also concluded that there is no significant difference in the achievement of boys and girls when taught in large or regular sized groups.

Higher Education Investigations

The first study using an appropriate research format to investigate class size at the college level was conducted by Edmonson and Mulder.[42] Two classes, one of forty-five pupils and one of 109 pupils, were compared on achievement. The investigators concluded that there was no significant differences between the two groups. A similar research plan was followed by Kirk.[43] He also found no significant difference between the large and small group.

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[41] Joseph Vincent Madden, "An Experimental Study of Student Achievement in General Mathematics in Relation to Class Size," (unpublished Doctor's dissertation, Tempe, Arizona, Arizona State University Library, 1966), 71 pp.

[42] J. B. Edmonson and F. J. Mulder, "Size of Class as a Factor in University Instruction," The Journal of Educational Research, 9:1-12, January 1924.

In an attempt to determine the effect of class size upon efficiency, Holland[44] investigated eight classes ranging in size from 26 to 112 students. He concluded that class size did not significantly influence teaching efficiency.

In the period from 1930 to 1953 there were few class size studies on the college level. In 1955, the Miami Ohio University began a three year investigation of class size. These investigations are probably the most comprehensive studies of class size from 1920 to the present. Siegler, Macomber, and Adams[45] have served as researchers and advisors in virtually all investigations dealing with class size from 1955 to 1958 at Miami. These investigations have used three general approaches: (a) large lecture sections with relatively little discussion in class by students; (b) large sections taught by a combination of lecture and problem solving or case study techniques, and (c) multiple sections of approximately thirty-five students. Each experimental section was equated with a control section of the same course. The control sections were, with one exception, limited to a maximum enrollment of thirty-five students. The exception occurred in the case of zoology, where televised instruction was compared to large lecture instruction, rather than to small class instruction. The course content, final examination, and instructor were held constant. Students were equated by achievement tests and by grade point. The evaluation of instructional effectiveness in all courses was focused upon three primary areas: achievement, student's attitudes about the course and instructor, and student's attitudes about the mode of instruction. The results were as follows:

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[43] John R. Kirk, "A Study of Class Size, Teaching Efficiency, and Student Achievement," Phi Delta Kappan, 12*59-61, August, 1929.

[44] B. F. Holland, "The Effect of Class Size on Scholastic Achievement in Educational Psychology," School and Society, 27:668-670, June 1928.

[45] Laurance Siegel, F.G. Macomber, and James F. Adams, "The Effectiveness of Large Group Instruction at The University Level," Harvard Education Review, Vol. 24, 1959, pp. 216-225.

Achievement. The difference between mean achievement of students in the experimental and control sections is statistically significant only in the case of geopgraphy, second semester. With the exception of this one instance, it is quite evident that achievement as measured by the objective final examination was not adversely affected by instruction in classes that are larger than conventional size. An analysis of high and low ability students led to the conclusion that ability does not interact with section assignment as a joint determinant of achievement.

It is apparent that objective final examination scores are not adversely affected by large group instruction and that high ability students perform equally well on such tests regardless of instructional procedure. The low ability sub group is occasionally, but not often, penalized by assignment to a large class rather than a small class.

Students' attitudes about the course and instructor. Data pertaining to students' attitudes about the course and the effectiveness of the instructor were obtained from the administration of two attitude scales in the experimental and control sections of each course. There seems to be some evidence for the generalization that instructors and their courses tend to be rated somewhat less favorably by students in experimental (large) sections than by students in control (small) sections.

PROCEDURE

The procedure used in the investigation included the selection of the sample, selection of the instructors, the basic design of the study, selection of instruments employed, and statistical techniques used.

Selection of the Sample.

The subjects included in the investigation were 224 male and female students enrolled at Ed W. Clark High School, Las Vegas, Nevada during the 1966-67 academic year. The subjects were divided into two groups: experimental groups (composed of students from above average size classes) and control groups (composed of students from average size classes). The composition of the groups follows:

Academic Area	Group Type	Group Size	Grade Level	Instructor
Business Law	Experimental	50	9, 10, 11, 12	A
	Control	26	9, 10, 11, 12	A
Introduction to Business	Experimental	52	9, 10, 11, 12	A
	Control	27	9, 10, 11, 12	A
United States Government	Experimental	45	11, 12	B
	Control	24	11, 12	B

A table of random numbers was employed to assign students to groups and the selection of experimental and control groups was determined arbitrarily.

The foregoing procedure was used to assign students who enrolled at Clark High School before the end of the 1965-66 academic year. Students who registered for a class in an academic area under investigation after the close of the 1965-66 school year were assigned to groups on an alternating basis as determined by the chronological order of their arrival at Clark High School. Students who enrolled later than the end of the sixth week of the 1966-67 academic school year were not included in the study.

Some attrition was experienced as a result of student transfer.

Selection of the Instructors.

Instructors were selected to teach the classes under investigation because of their preparation and previous experience. This approach to instructor selection was also an attempt to control Type G errors. Teacher "A" was assigned to teach the experimental and control groups in Business Law and Introduction to Business. Teacher "B" was assigned to teach the experimental and control groups in U.S. Government.

Design of the Study.

The investigation began nine weeks after the start of the 1966-67 academic year and continued for nineteen weeks. The students involved were administered the California Short-Form Test of Mental Maturity during the first week of the investigation. A mean intellectual level was established for each group. During this same period of time the instructors were administered the Minnesota Teacher Attitude Inventory to determine the similarities or dissimilarities in expressed teacher-pupil relations.

The students involved in this investigation were also administered the Clark High School Short-Form Attitude Survey during the first week of the study. The instrument was used to assess the initial attitudes toward Clark High School expressed by the students. A teacher-made objective test was also administered to the groups at the end of the first week of the study. The teacher-made test was used to determine the students' level of academic attainment in each of the academic areas under investigation.

The students were again administered the Clark High School Attitude Survey after seventeen weeks of the investigation had elapsed. The students also took at this time the second administration of the teacher-made test.

The allotted class time was identical for all groups, and with one exception, all groups met in the morning portion of the school day--the Introduction to Business control group met in the afternoon fifty percent of the time.

The physical classroom environment was the same for both experimental and control groups in each academic area. The textbooks and supplementary books were the same for the experimental and control groups.

Instruments.

The instruments used in the study included the California Short-Form Test of Mental Maturity, the Minnesota Teacher Attitude Inventory, the Ed W. Clark High School Short-Form Student Attitude Survey, and teacher-made objective tests in each academic area involved.

California Short-Form Test of Mental Maturity.

Authors: Wlizabeth T. Sullivan, Willis W. Clark, and Ernest W. Tiegs
Publisher: California Test Bureau
Date of Publication: 1963

The 1963 California Short-Form Test of Mental Maturity is a paper and pencil intelligence test. It is composed of seven of the twelve sections that compose the California Test of Mental Maturity. The seven sections or subtests yeild four factors: logical reasoning, numerical reasoning, verbal concepts, and memory. All tests are of the multiple-choice type, and are arranged in ascending order of difficulty in each subtest.

The CTMM Short-Form is available in six levels, from pre-school to adult. There is considerable evidence to show a high relationship between the CTMM and other intelligence tests such as the Stanford-Binet and the Kuhlmann-Anderson.

Norms are based on a group of 25,000 cases for which control data from other standardized tests were available. Reliability coefficients run between .79 and .91. The validity is shown in difficulty indices, which run from 44.2 to 79.0.[46]

The Minnesota Teacher Attitude Inventory.

Authors: Carroll H. Leeds, Robert Callis, and Walter W. Cook
Publisher: Psychological Corporation
Date of Publication: 1951

The Minnesota Teacher Attitude Inventory (originally titled the Teacher Pupil Inventory) is an instrument designed to predict the degree to which teachers or potential teachers will establish satisfactory relationships with pupils. The test-taker is asked to react to 150 opinion statements which are to be marked from "strongly agree" to "strongly disagree." Using the literature on teacher-pupil behavior, 378 opinion items were compiled and a positive and negative form of each item was constructed, thus creating about 750 items. The validity of individual items was judged to be the power of that item to discriminate between those teachers having desired or undesired relations with pupils.

Principals in seventy elementary and secondary schools in Pennsylvania and Ohio were asked to select several teachers in their school who were "superior" and several judged "inferior" in ability to maintain "harmonious relations" in their classroom. One hundred "superior" and one hundred "inferior" teachers completed two forms of the inventory. Chi Square was used to determine the degree to which each of the 380 items discriminated between the two groups. One hundred and sixty-four items were selected for use in the final form. The instrument was then administered to 100 teachers and their scores were correlated with three criteria:

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[46] Elizabeth T. Sullivan, Willis W. Clark, and Ernest W. Tiegs, Technical Report on The California Test of Mental Maturity Series (Monterey: California Test Bureau, 1963), pp. 15-20.

(1) ratings of teachers by their principals, (2) classroom rating by Leeds using a modification of the Baxter Rating Scale of the Teacher's Personal Effectiveness, and (3) ratings of the teachers by their pupils on a 50-item "My Teacher" questionnaire. The correlations between the three criteria and the inventory were .43, .49, and .45 respectively, all significant at the .01 level of confidence. When combined, the three criteria gave a validity coefficient of .59. A multiple correlation of the three criteria reacher .60. The split-half reliability (Spearman-Brown correction) was .91.[47]

The Ed. W. Clark High School Short-Form Student Attitude Survey.

Author: George A. Jeffs
Publisher: Clark High School
Date of Publication: 1965

The Ed W. Clark High School Short-Form Student Attitude Survey is a revised edition of the Ed W. Clark High School Student Attitude Survey. The original instrument used a Likert type attitude scale to measure six aspects of students' attitudes toward Clark High School. The six aspects measured included:

Subscale A, Attitude Toward Student Body. These items are designed to measure students' attitudes toward their peer group such as general appearance, attitudes, habits, and general behavior.

Subscale B, Physical Plant. These items are designed to measure students' attitudes toward the physical environment at Clark High School such as classroom design, adaptability of furniture, and physical conduciveness to learning.

Subscale C, Teachers. These items are designed to measure those aspects of the students' over-all attitudes toward school situations which relate specifically to teachers.

Subscale D, Administrators. These items are designed to measure students' attitudes toward the principal and vice principals of Clark High School such as the administrator's degree of elexibility, or the degree of democratic framework in which he works.

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[47] N. L. Gage (ed), Handbook of Research on Teaching (Chicago: Rand McNally Company, 1963), p. 509.

Subscale E, Curriculum. These items are designed to measure the specific educational program and curriculum at Clark High School. These items assess students' stated values of the curricular design, the practicality of the curricular offerings, and the appropriateness of the school's educational program.

Subscale F, Educational Values. These items are disigned to measure students' attitudes toward the importance of education. Student responses indicate the degree to which the student values education as a means of attaining future goals.

The original survey was pre-tested at Valley High School, Las Vegas, Nevada. An item analysis of the survey produced sixty-five acceptable items from the ninety-six items included in the pretest. The Spearman-Brown Prophesy Formula was used to determine a .96 corrected split-half reliability for the toatl instrument.

The Teacher-Made Objective Tests.

The teacher-made objective tests in each academic area were composed of multiple-choice questions, matching questions, and short answer questions. The tests took from forty-five to sixty-five minutes to complete. Standardized answer sheets were provided to record the students' answers. The split-half reliability for the Introduction to Business Test proved to be .97. The split-half reliability for the Business Law Test was .95, while a reliability of .95 was obtained for the Government Test.

Statistical Techniques.

The statistical techniques employed for this investigation will be briefly described.

Analysis of the Results of the Minnesota Teacher Attitude Inventory.

The scores obtained by the instructors were compared with the means, standard deviations, and percentile ranking of the norm group used to standardize the instrument. The instructors' scores were then empirically analyzed to determine if there was a difference between scores.

Analysis of the Results of the California Short Form Test of Mental Maturity.

The *t*-test was applied to the mean I.Q. scores for the average and above average groups in each academic area to determine if the groups differed significantly in intelligence as shown on the CTMM short-form.

A test of homogeneity of variance was used to determine the intellectual variability of the groups.

Analysis of the Results of the Ed W. Clark High School Student Attitude Survey, Short-Form.

Analysis of the attitude survey was accomplished by observing the percentage of student responses to each item and the differences of responses to positive and negative direction. The difference between the positive and negative responses of the groups was determined by use of the significance of the difference of percents between two independent groups.

Analysis of the Results of the Teacher-Made Objective Tests.

A *t*-test was used to determine if the mean achievement scores of the groups were significantly different on the pretest. A test of homogeneity of variance was used to determine the variability differences in achievement between the two groups. Reliabilities were determined by using the Spearman-Brown Prophecy Formula. Analysis of covariance was used to determine if the groups differed significantly in achievement on postests.

RESULTS

The results of this research are presented in the following subsections: (1) analysis of teacher differences, and (b) analysis of student differences.

Analysis of Teacher Differences.

The initial similarities or dissimilarities in teacher attitudes toward pupils were determined by a comparison of the score made by each instructor on the Minnesota Teacher Attitude Inventory with the scores of the norm group used to validate the instrument.

Instructor A received a score of 36, which deviated 11.3 from the norm group mean and gave him a percentile rank of 61.

Instructor B received a score of 40, which deviated 15.3 from the norm group mean and gave him a percentile rank of 64.

The difference in scores obtained by the two instructors is empirically not significant.

Analysis of Student Differences.

The results of student differences found in this investigation are presented in the following subsections: (1) intelligence distributions of the groups, (2) student achievement in Business Law, (3) student achievement in Introduction to Business, (4) student achievement in Government, (5) student attitudes in Business Law, (6) student attitudes in Introduction to Business, (7) student attitudes in Government, and (8) concomitant attitude findings.

Intelligence Distributions of the Groups.

Table 1 indicates that the application of a t-test revealed no significant differences in mean intelligence scores between the experimental and control groups in Business Law, Introduction to Business, and Government. The greatest difference occurred between the experimental and control groups in Business Law. The test of homogeneity revealed no significant differences in variance between the experimental and control groups.

Table 1. Values of *t* and test of homogeneity of variance for pretest intelligence scores, experimental and control groups

	Business Law		Introduction to Business		Government	
	Experimental	Control	Experimental	Control	Experimental	Control
Number	54	30	66	32	49	27
Mean	109.0	110.5	101.6	102.8	109.5	108.0
Standard Deviation	12.44	14.82	17.82	16.77	17.32	20.48
Homogeneity of Variance	1.43		1.07		1.09	
t value	0.48		0.31		0.32	

Student Achievement, Business Law.

A *t* test determined that there were no significant pretest differences between the experimental and control groups in achievement in Business Law. Table 2 shows the results of the *t* test analysis. It may also be noted from Table 2 that the test of homogeneity revealed no significant differences in variance between the two groups.

Table 3 indicates that an F-value of 0.78 was obtained from a comparison of the control and experimental groups on posttest achievement in Business Law. The adjusted mean for the experimental group was 58.5 and the control group had an adjusted mean of 59.0. The F-value did not reach a significant level. Therefore, the adjusted posttest means of the two groups did not differ significantly.

Table 2. Value of t and homogeneity of variance for pretest achievement scores, experimental and control groups, business law

	Experimental	Control
Mean	68.94	69.38
Standard Deviation	10.54	10.34
Homogeneity of Variance	1.03	
t value	0.07	

Table 3. F ratio for adjusted posttest mean achievement scores, experimental and control groups, business law

Source of Variance	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	1	4.99	4.99	
Within	72	4690.34	65.14	0.78

Student Achievement, Introduction to Business.

The results of a t test analysis of pretest achievement in Introduction to Business are shown in Table 4. The t value was 0.63 indicating no significant difference between the experimental and control groups in pretest achievement in Introduction to Business. The test of homogeneity produced no significant variance differences.

The results of posttest data analysis may be seen in Table 5. An experimental group posttest adjusted mean of 76.2 and a control group posttest adjusted mean of 75.9 were discovered. It may be noted that the F value, indicating the degree of difference between these posttest adjusted means, was 0.02. This value indicates that the posttest means were not significantly different.

Table 4. Value of t and homogeneity of variance for pretest achievement scores, experimental and control groups, Introduction to Business

	Experimental	Control
Mean	74.52	72.22
Standard Deviation	16.55	12.13
Homogeneity of Variance	1.07	
t value	0.63	

Table 5. F ratio for adjusted posttest mean achievement scores, experimental and control groups, Introduction to Business

Source of Variance	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	1	1.78	1.78	
Within	75	6371.60	84.95	0.02

Student Achievement, Government.

Table 6 indicates that there were no significant pretest achievement differences between the experimental and control groups in Government. The test of homogeneity showed that the variance between groups was not significantly different.

The results of posttest data analysis may be seen in Table 7. The posttest adjusted achievement means were 34.3 for the experimental group and 36.4 for the control group. Table 7 reveals that an F value of 6.67 reflects a significant difference in achievement between the two groups. It may be noted that the control group scored significantly higher than the experimental group.

Table 6. Value of t and homogeneity of variance for pretest achievement scores, experimental and control groups, Government

	Experimental	Control
Mean	33.49	33.21
Standard Deviation	5.26	3.44
Homogeneity of Variance	1.01	
t value	0.24	

Table 7. F ratio for adjusted posttest mean achievement scores, experimental and control groups, Government

Source of Variance	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	1	70.05	70.05	
Within	65	682.46	10.50	6.67*

*Significant at the .05 level.

Student Attitude, Business Law.

Table 8 indicates that there was no significant pretest difference in positive responses made by the experimental group as compared to the control group. There was also no significant difference between the negative responses of the experimental group as compared to the control group.

It may also be noted that there was no significant posttest difference in positive responses made by the experimental group as compared to the control group. No significant difference existed between negative responses made by the experimental group as compared to the control group.

Table 8. Pretest and posttest positive and negative attitude percentage differences between experimental and control groups, Business Law

	Pretest	Posttest
	z Value	z Value
Positive	0.62	0.84
Negative	0.74	0.45

Student Attitude, Introduction to Business.

Table 9 reveals that the experimental and control groups did not differ significantly in pretest positive responses. There was also no significant difference between the pretest negative responses of the experimental and control groups.

A posttest z value of 0.95 indicated that there was no significant difference between the positive responses of the experimental group as compared to the control group. Analysis of the negative responses of the experimental as opposed to the control group revealed no significant difference, in posttest results.

Table 9. Pretest and posttest positive and negative attitude percentage differences between experimental and control groups, Business Law

	Pretest	Posttest
	z value	z value
Positive	1.77	0.95
Negative	1.55	0.79

Student Attitude, Government.

It may be observed from Table 10 that the percent of pretest positive responses of the experimental group did not differ significantly from the positive responses of the control group. There was no significant pretest difference between the negative responses of the experimental and control groups.

The posttest positive responses of the experimental group did not differ significantly from the posttest positive responses of the control group. Also, the posttest negative responses of the experimental group did not differ significantly from the negative responses of the control group.

Table 10. Pretest and posttest positive and negative attitude percentage differences between experimental and control groups, Government

	Pretest	Posttest
	z value	z value
Positive	0.12	0.02
Negative	0.05	0.40

Concomitant Attitude Findings.

An item breakdown of the percent of positive, neutral, or negative responses in Business Law, Introduction to Business, and Government is presented in the appendix of this paper. Many interpretations may be applied to the tables in the appendix. Space does not permit such interpretations here. It should be noted that a score of 4 or 5 represented a positive response for z value analysis. A score of 3 represented a neutral score for z value analysis. And a score of 1 or 2 represented a negative response for z value analysis. The mean score for each item is presented for purposes of comparison between academic areas.

INTERPRETATION

The only significant difference found in this investigation was that in achievement between the experimental and control groups in Government. The reader is referred to Table 7. Several reasons for this discovery may be submitted. The students enrolled in United States Government were chronologically older than the students enrolled in Business Law or Introduction to Business. Their chronological age may indicate greater maturity and consequently greater orientation toward achievement. Older students may have a stronger academic background which may result in their taking advantage of the verbal interaction that takes place in the classroom--interaction with peers and the teacher. Thus, the smaller group (control group) may lend itself to becoming a more cohesive unit and permit interaction in greater depth. The reader should also condider the possibility that United States Government may be a subject matter area which is better advanced through small group discussion rather than involving a larger number of students. Also, the teacher may have better "control" of a smaller group of students which in turn may reflect in student achievement.

The reader might also consider the possibility of differences in teachers and teaching methods in enhancing achievement. It will be noted on page 26 of this report that four of the groups involved in this investigation were instructed by Teacher A. Teacher A taught both Business Law and Introduction to Business. No significant differences were found between the groups taught by Teacher A. Two of the groups involved in this study, a large group in Government and a small group in Government, were instructed by Teacher B. A significant difference was found between the large and small groups taught by Teacher B (the smaller group showed greater achievement). This may lead one to consider the possibility that the significant difference found in achievement between the experimental and control groups in Government may have been promoted by the teacher rather than the subject matter.

SUMMARY

It was the purpose of this investigation to determine if students showed a difference in acaddmic attainment or attitude toward school as a result of membership in an average or above average size group. A review of previous research dealing with the influence of class size on academic attainment and attitude failed to produce a consistent pattern favoring average or above average size groups. It was noted that the number of investigations focusing on class size has declined in recent years.

The subjects included in the current investigation were 224 male and female students in average and above average size classes in Business Law, Introduction to Business, and Government. Students were scheduled into classes randomly. Pretest and posttest scores on teacher-made tests were analyzed to measure academic attainment, while the pretest and posttest opinionnaire results were used to determine differences in student attitudes. The purpose of the analysis was to test the tenability of the null hypotheses presented in the forepart of this report. Each hypothesis was examined to determine if it should be accepted or rejected. To merit rejection, the F values, t values, or z values must have reached the .05 level of confidence.

The hypotheses will now be restated and findings related to each hypothesis will be offered.

1. There will be no significant difference in academic attainment in Business Law between students taught in average size groups and students taught in above average size groups.

   Results, hypothesis 1

   A review of Table 3 will show that an F value of 0.78 resulted from the comparison of achievement between the experimental and control groups. The F value did not reveal a significant difference. Hypothesis number 1 must be accepted.

2. There will be no significant difference in academic attainment in Introduction to Business between students taught in average size groups and students taught in above average size groups.

Results, hypothesis 2

It may be noted from Table 5 that a posttest F value of 0.02 was reached. It was concluded that this F value did not indicate a significant difference between the academic attainment of the experimental and control groups. Hypoehesis number 2 must be accepted.

3. There will be no significant differenence in academic attainment in U.S. Government between students taught in average size groups and students taught in above average size groups.

Results, hypothesis 3

A review of Table 7 shows that the F value of 6.67 represents a significant difference in academic attainment in favor of the control group. It was thus determined that there was a significant difference in academic achievement between the experimental and control groups in U. S. Government and that this difference was significant at the .05 level of confidence. Hypothesis number 3 must be rejected.

4. There will be no significant difference in satisfaction with learning environment between students taught Business Law in average size and above average size groups.

Results, hypothesis 4

It may be noted on Table 8 that the z value for posttest positive responses was 0.84 and 0.45 for negative responses. These figures do not represent significant differences. Hypothesis number 4 must be accepted.

5. There will be no significant difference in satisfaction with learning environment between students taught Introduction to Business in average size and above average size groups.

   Results, hypothesis 5

   Table 9 shows that there was no significant difference between the positive responses of the experimental and control groups or between the negative responses of the experimental and control groups. The z value for posttest positive responses was 0.95 and the z value for negative responses was 0.79. Hypothesis number 5 must be accepted.

6. There will be no significant difference in satisfaction with learning environment between students taught U.S. Government in average size and above average size groups.

   Results, hypothesis 6

   An overview of Table 10 shows no significant posttest differences between the positive responses of the experimental and control groups and the negative responses of the experimental and control groups. z values of 0.02 and 0.40 respectively were obtained. Hypothesis number 6 must be accepted.

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APPENDIX

Question No. 1 The teachers here often talk over our heads.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	3.57	35.71	32.14	28.57		3.17
Government Experimental	8.89	46.67	31.11	13.33		3.51
Intro. to Bus. Control	7.41	48.15	25.93	18.52		3.44
Intro. to Bus. Experimental	3.85	25.00	36.54	17.31	17.31	2.62
Bus. Law Control	7.69	38.46	30.77	23.08		3.31
Bus. Law Experimental	14.00	36.00	20.00	26.00	4.00	3.30
TOTAL SCHOOL SURVEY						

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 2 Many of the teachers in this school seem to have very little real interest or enthusiasm for their jobs.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	10.71	35.71	25.00	21.43	7.14	3.13
Government Experimental	4.44	42.22	24.44	15.56	13.33	3.09
Intro. to Bus. Control	22.22	48.15	25.93		3.70	3.85
Intro. to Bus. Experimental	15.38	36.54	15.38	21.15	11.54	3.23
Bus. Law Control	23.08	34.62	15.38	23.08	3.84	3.58
Bus. Law Experimental	4.00	3.00	22.00	22.00	22.00	2.72
TOTAL SCHOOL SURVEY	12.74	37.26	29.09	14.18	6.37	3.35

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 3 The teachers in this school do not enforce school regulations.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	12.50	33.33	29.17	25.00		3.33
Government Experimental	6.67	37.78	26.67	20.00	8.89	3.13
Intro. to Bus. Control	25.93	37.04	25.93	7.41	3.70	3.74
Intro. to Bus. Experimental	17.31	44.23	30.77	7.69		3.71
Bus. Law Control	19.23	34.62	19.32	15.38	11.54	3.35
Bus. Law Experimental	20.00	36.00	22.00	12.00	10.00	3.44
TOTAL SCHOOL SURVEY	27.12	37.67	20.37	9.57	5.28	3.72

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 4 I believe that the grades I get in this school do not give a fair indication of what I know.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Category*					Mean For ITEM
GROUP	5	4	3	2	1	
Government Control	4.17	16.67	41.57	25.00	12.50	2.75
Government Experimental	8.89	28.89	20.00	28.89	13.33	2.91
Intro. to Bus. Control	11.11	33.33	33.33	11.11	11.11	2.85
Intro. to Bus. Experimental	5.77	21.15	28.85	26.92	17.31	2.71
Bus. Law Control	11.54	3.84	7.69	46.15	30.77	2.19
Bus. Law Experimental	2.00	4.00	26.00	46.00	22.00	2.18
TOTAL SCHOOL SURVEY	7.17	24.72	19.78	27.44	20.89	2.70

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 5 The teachers in this high school let us make our own decisions about many things.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	16.67	50.00	16.67	12.50	4.17	3.63
Government Experimental	2.22	31.11	24.44	26.67	15.56	2.78
Intro. to Bus. Control	18.52	37.04	18.52	14.82	11.11	3.37
Intro. to Bus. Experimental	3.85	44.23	19.23	21.15	11.54	3.07
Bus. Law Control	3.84	46.15	11.54	19.23	19.23	2.96
Bus. Law Experimental	4.00	46.00	4.00	26.00	20.00	2.88
TOTAL SCHOOL SURVEY	11.88	40.94	15.37	21.13	10.68	3.22

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 6 Our School offers a good education for the average student but offers very little for the person who is below or above average.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Category*					Mean For ITEM
GROUP	5	4	3	2	1	
Government Control	4.17	45.83	37.50	8.33	4.17	3.38
Government Experimental	8.89	31.11	31.11	20.00	8.89	3.11
Intro. to Bus. Control	3.70	44.44	25.93	7.41	18.52	3.07
Intro. to Bus. Experimental	13.46	30.77	19.23	19.23	17.31	3.04
Bus. Law Control	7.69	38.46	26.92	23.08	3.84	3.23
Bus. Law Experimental	4.00	34.00	32.00	22.00	8.00	3.04
TOTAL SCHOOL SURVEY	20.00	35.56	21.48	15.36	7.65	3.45

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 7 I believe I am learning many things in high school that will help me to get more satisfaction out of adult life.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control		45.83	33.33	16.67	4.17	3.21
Government Experimental	11.11	37.78	22.22	17.78	11.11	3.20
Intro. to Bus. Control	22.22	48.15	7.41	14.82	7.41	3.63
Intro. to Bus. Experimental	9.62	57.69	15.39	13.46	3.85	3.56
Bus. Law Control	15.38	42.31	19.23	11.54	11.54	3.52
Bus. Law Experimental	8.00	54.00	14.00	8.00	16.00	3.30
TOTAL SCHOOL SURVEY	22.08	47.58	18.34	7.43	3.84	3.78

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 8 The teachers in this school do not give us enough individual help.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control		12.50	50.00	33.33	4.17	2.71
Government Experimental	4.44	11.11	33.33	40.00	11.11	2.58
Intro. to Bus. Control		40.74	37.04	11.11	11.11	3.07
Intro. to Bus. Experimental	3.85	9.62	25.00	28.85	32.69	2.23
Bus. Law Control	3.84	15.38	26.92	30.77	23.08	2.46
Bus. Law Experimental	2.00	14.00	38.00	3.00	16.00	2.56
TOTAL SCHOOL SURVEY	6.85	30.48	21.42	24.36	16.89	2.86

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 9 Most of the teachers in our school seem to like their work and enjoy helping students.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category*					Mean For ITEM
	5	4	3	2	1	
Government Control	4.17	41.67	33.33	12.50	8.33	3.21
Government Experimental	4.44	42.22	24.44	24.44	4.44	3.18
Intro. to Bus. Control	14.82	40.74	22.22	18.52	3.70	3.44
Intro. to Bus. Experimental	9.62	46.15	23.07	13.46	7.67	3.63
Bus. Law Control	7.69	42.31	23.08	11.54	15.38	3.15
Bus. Law Experimental	6.00	46.00	22.00	14.00	12.00	3.20
TOTAL SCHOOL SURVEY	14.89	44.54	24.78	10.65	5.13	3.53

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 10 Some of our teachers seem to know very little about the subjects they are teaching.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category*					Mean For ITEM
	5	4	3	2	1	
Government Control	8.33	33.33	29.17	20.83	8.33	3.13
Government Experimental	6.67	35.56	28.89	24.44	4.44	3.16
Intro. to Bus. Control	3.70	25.93	25.93	33.33	11.11	2.78
Intro. to Bus. Experimental		17.31	30.77	36.54	15.38	2.50
Bus. Law Control	15.38	26.92	15.38	19.23	23.08	2.92
Bus. Law Experimental		36.00	18.00	38.00	8.00	2.82
TOTAL SCHOOL SURVEY	18.66	35.17	16.75	18.06	11.36	3.32

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 11 When you do a good job in this school no one seems to notice, but when you do a poor job the teachers let you know about it.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Category*					Mean For ITEM
GROUP	5	4	3	2	1	
Government Control		16.67	29.17	33.33	20.83	2.42
Government Experimental		6.67	24.44	31.11	13.33	3.44
Intro. to Bus. Control	3.70	25.93	25.93	33.33	11.11	2.78
Intro. to Bus. Experimental		17.31	30.77	36.54	15.38	2.50
Bus. Law Control		30.77	30.77	19.23	19.23	2.73
Bus. Law Experimental	4.00	26.00	28.00	16.00	26.00	2.86
TOTAL SCHOOL SURVEY	6.43	21.01	20.89	27.32	24.35	2.58

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 12 Much of what we learn seems unrelated to the important things going on in the world today.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Catetory* 5	4	3	2	1	Mean For ITEM
Government Control		29.17	33.33	20.83	16.67	2.75
Government Experimental	8.89	20.00	33.33	28.89	8.89	2.91
Intro. to Bus. Control	11.11	40.74	11.11	25.93	11.11	3.15
Intro. to Bus. Experimental	9.62	25.00	28.85	21.15	15.38	2.92
Bus. Law Control	11.54	30.77	26.92	19.23	11.54	3.12
Bus. Law Experimental	4.00	12.00	20.00	44.00	20.00	2.36
TOTAL SCHOOL SURVEY	10.60	32.67	23.82	22.82	10.10	3.11

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 13 In a school like ours, the students get more attention from the teachers and learn more.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control		20.83	50.00	20.83	8.33	2.83
Government Experimental		15.56	35.56	35.56	13.33	2.53
Intro. to Bus. Control	11.11	14.82	51.85	18.52	3.70	3.11
Intro. to Bus. Experimental	1.92	28.85	36.54	11.54	21.15	2.79
Bus. Law Control	3.85	11.54	34.62	30.77	19.23	2.50
Bus. Law Experimental		14.00	44.00	22.00	20.00	2.52
TOTAL SCHOOL SURVEY	8.11	27.76	33.42	22.36	8.35	3.05

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 14 The teachers in our school try to treat everyone fairly.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Category*					Mean For ITEM
GROUP	5	4	3	2	1	
Government Control	12.50	29.17	29.17	12.50	16.67	3.08
Government Experimental		44.44	20.00	15.56	20.00	2.89
Intro. to Bus. Control	7.41	48.15	18.52	14.82	11.11	3.26
Intro. to Bus. Experimental	13.48	23.07	34.62	15.38	13.46	3.08
Bus. Law Control	11.54	30.77	23.08	19.23	15.38	3.04
Bus. Law Experimental	10.00	26.00	18.00	24.00	22.00	2.78
TOTAL SCHOOL SURVEY	12.61	32.65	22.81	17.41	14.53	3.11

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 15 The teachers in this school do not care if we pass or fail.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	12.50	29.17	12.50	33.33	12.50	2.96
Government Experimental	11.11	35.56	24.44	22.22	6.67	3.22
Intro. to Bus. Control	11.11	37.04	25.93	18.52	7.41	3.26
Intro. to Bus. Experimental	1.92	28.85	36.54	23.07	9.62	2.90
Bus. Law Control	19.23	30.77	19.23	23.08	7.69	3.31
Bus. Law Experimental	16.00	26.00	26.00	24.00	18.00	2.78
TOTAL SCHOOL SURVEY	16.42	30.99	23.70	16.67	12.22	3.23

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 16 I believe that the teachers here think they are as much a part of the school as the students do.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	20.83	41.67	29.17	8.33		3.75
Government Experimental	15.56	44.44	15.56	15.56	8.89	3.42
Intro. to Bus. Control	18.52	55.55	11.11	11.11	3.70	3.74
Intro. to Bus. Experimental	7.69	51.92	21.15	13.46	5.77	3.42
Bus. Law Control	7.69	42.31	19.23	15.38	15.38	3.12
Bus. Law Experimental	14.00	38.00	16.00	24.00	8.00	3.26
TOTAL SCHOOL SURVEY	15.70	48.58	21.76	8.41	5.56	3.60

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 17 Many of the things we learn at this school are impractical and out of date.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Category*					Mean For ITEM
GROUP	5	4	3	2	1	
Government Control	8.33	41.67	29.17	16.67	4.17	3.38
Government Experimental	6.67	46.67	37.78	4.44	4.44	3.47
Intro. to Bus. Control	11.11	48.15	25.93	11.11	3.70	3.52
Intro. to Bus. Experimental	5.77	44.23	23.07	25.00	1.92	3.27
Bus. Law Control		46.15	19.23	26.92	7.69	3.04
Bus. Law Experimental	4.00	30.00	42.00	20.00	4.00	3.10
TOTAL SCHOOL SURVEY	27.15	36.72	17.34	11.00	7.78	3.64

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 18 Most of our school work is interesting and worthwhile.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	4.17	29.17	41.67	20.83	4.17	3.08
Government Experimental	2.22	42.22	20.00	26.67	8.89	3.02
Intro. to Bus. Control	7.41	51.85	7.41	22.22	11.11	3.22
Intro. to Bus. Experimental	7.69	51.92	17.31	21.15	1.92	3.42
Bus. Law Control	34.62	34.62	19.23	41.54		3.92
Bus. Law Experimental		24.00	30.00	42.00	4.00	2.74
TOTAL SCHOOL SURVEY	9.80	40.44	24.88	18.75	6.13	3.29

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 19 I believe that most of the teachers in this school do not like their jobs very much.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control	8.33	37.50	45.83	8.33		3.46
Government Experimental	11.11	40.00	33.33	13.33	2.22	3.33
Intro. to Bus. Control	3.70	48.15	40.74	7.41		3.48
Intro. to Bus. Experimental	5.77	21.15	50.00	19.23	3.85	2.83
Bus. Law Control	23.08	42.31	23.08	7.69	3.84	3.73
Bus. Law Experimental	4.00	48.00	24.00	16.00	8.00	3.24
TOTAL SCHOOL SURVEY	13.72	36.59	34.98	9.89	4.82	3.44

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 20 Many of the teachers in this school treat high school students as if they were still children.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control		25.00	20.83	29.17	25.00	2.46
Government Experimental	6.67	6.67	26.67	37.78	22.22	2.38
Intro. to Bus. Control	11.11	40.74	18.52	25.93	3.70	3.41
Intro. to Bus. Experimental	3.85	15.38	30.77	30.77	19.23	2.54
Bus. Law Control	11.54	26.92	11.54	26.92	23.08	2.77
Bus. Law Experimental		18.00	20.00	16.00	46.00	2.10
TOTAL SCHOOL SURVEY	6.20	19.35	20.10	30.27	24.07	2.53

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 21 Many school teachers seem to know a lot about what is in books but very little else.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Category*					Mean For ITEM
GROUP	5	4	3	2	1	
Government Control		25.00	37.50	16.67	20.83	2.67
Government Experimental	2.22	24.44	31.11	26.67	15.56	2.71
Intro. to Bus. Control		55.55	18.52	14.82	11.11	3.15
Intro. to Bus. Experimental	3.85	38.46	32.69	17.31	7.69	3.13
Bus. Law Control	3.84	30.77	19.23	26.92	19.23	2.73
Bus. Law Experimental	4.00	24.00	24.00	34.00	14.00	2.70
TOTAL SCHOOL SURVEY	8.64	30.13	28.21	23.89	9.12	3.05

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 22 The teachers here really seem interested in helping us learn.

ANALYSIS OF RESPONSES

GROUP	Percent Responding to Weight Category* 5	4	3	2	1	Mean For ITEM
Government Control		45.83	33.33	16.67	4.17	3.21
Government Experimental	6.67	33.33	37.78	15.56	6.67	3.18
Intro. to Bus. Control	7.41	33.33	44.44	11.11	3.70	3.30
Intro. to Bus. Experimental	1.92	44.23	44.23	5.77	3.85	3.62
Bus. Law Control	7.69	46.15	26.92	11.54	7.69	3.35
Bus. Law Experimental		30.00	46.00	14.00	10.00	2.96
TOTAL SCHOOL SURVEY	9.12	42.26	30.85	11.64	6.12	3.37

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 23 I like teaching where they are always experimenting with new ideas such as teaching in large and small groups.

ANALYSIS OF RESPONSES

	Percent Presonding to Weight Category*					Mean For ITEM
GROUP	5	4	3	2	1	
Government Control	8.33	33.33	41.67	12.50	4.17	3.29
Government Experimental	6.67	44.44	11.11	26.67	11.11	3.09
Intro. to Bus. Control	14.82	37.04	29.63	11.11	7.41	3.41
Intro. to Bus. Experimental	17.31	42.31	21.15	15.38	3.85	3.54
Bus. Law Control	19.23	42.31	11.54	19.23	7.69	3.46
Bus. Law Experimental	16.00	54.00	6.00	16.00	8.00	3.54
TOTAL SCHOOL SURVEY	18.99	35.94	22.24	12.26	8.00	3.41

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. *24 Being a teacher requires a high level of intelligence and education.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Category*					Mean For
GROUP	5	4	3	2	1	ITEM
Government Control	37.50	29.17	16.67	12.50	4.17	3.83
Government Experimental	22.22	40.00	20.00	15.56	2.22	3.64
Intro. to Bus. Control	22.22	55.55	3.70	14.82	3.70	3.85
Intro. to Bus. Experimental	28.85	53.85	9.62	3.85	3.85	4.00
Bus. Law Control	34.62	42.31	3.84	7.69	11.54	3.81
Bus. Law Experimental	16.00	30.00	24.00	24.00	6.00	3.26
TOTAL SCHOOL SURVEY	30.05	40.64	16.38	9.24	3.69	3.84

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree

Question No. 25 The seats, walls, halls, and classrooms at this school are real nice and help to make students want to learn.

ANALYSIS OF RESPONSES

	Percent Responding to Weight Catehory*					Mean For
GROUP	5	4	3	2	1	ITEM
Government Control	16.67	45.83	12.50	16.67	8.33	3.46
Government Experimental	17.78	28.89	31.11	6.67	15.56	3.27
Intro. to Bus. Control	25.93	37.04	18.52	11.11	7.41	3.63
Intro. to Bus. Experimental	23.07	23.07	23.07	15.38	15.38	3.23
Bus. Law Control	26.92	26.92	23.08	7.69	15.38	3.42
Bus. Law Experimental	16.00	24.00	38.00	14.00	8.00	3.26
TOTAL SCHOOL SURVEY	22.35	30.43	29.17	10.98	7.07	3.50

* 5=strongly agree
4=agree
3=neither agree nor disagree
2=disagree
1=strongly disagree